Postural stability during locomotion: the effects of object tracking and dual tasking

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The evolution of the fovea centralis, alongside smooth pursuit (SP) eye movements, resulted in the ability of primates to resolve moving objects in the visual field. SP is of major adaptive importance, playing an important role in reducing the challenges of object tracking in the dense environments inhabited by our woodland dwelling ancestors. It is consequently through SP that modern humans are able to maintain visual acuity in complex and visually 'cluttered' environments such as busy city centres. However, the requirements of SP must also be integrated with those of postural stability, and sensory inputs and functions prioritised according to immediate need due to the demand on processing. Although well understood individually, the effects that gaze control may consequently have on postural control are yet to be fully established. Therefore, this project assessed how object tracking using SP in varying levels of visual clutter impacts on foot pressure variability during locomotion in young healthy individuals. It also aimed to determine if the addition of a secondary cognitive task during SP further exacerbated any effects. The results demonstrate the presence of an optimal level of visual clutter at which foot pressure variability is lowest, and hence stability is greatest. Foot pressure variability was seen to increase in the presence of a secondary cognitive task, and hence it appears that posture acquiesces to visual and cognitive requirements. This work therefore has implications in the design of the built environment, particularly with respect to vulnerable users such as the elderly and infirm.

A giant, skeletally immature individual of *Apatosaurus* from the Morrison Formation of Oklahoma

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USAA collection of *Apatosaurus* fossils from the Morrison Formation of the Oklahoma panhandle represents several individuals, including at least one of exceptional size. Elements from the largest individual include cervical, dorsal, and caudal vertebrae, ribs, a partial scapulocoracoid, distal femur, fibula, and pedal elements. These elements are all 11–30% larger (linearly) than the equivalent bones from CM 3018, the mounted *Apatosaurus* at the Carnegie Museum. Surprisingly, the giant Oklahoma *Apatosaurus* was not skeletally mature when it died. A dorsal vertebra, OMNH 1329, has a visible neurocentral fusion line – these are all remodelled away in CM 3018. More compellingly, a very large cervical rib, OMNH 1368, is unfused. This is consistent with fusion patterns in other neosauropods, in which neurocentral fusion precedes fusion of the cervical ribs. In *Diplodocus* and *Giraffatitan*, the largest individuals with unfused cervical ribs are less than 80% the linear size (and therefore only half the mass) of the largest known individuals. Despite its immense size, the Oklahoma giant probably was not done growing, and does not represent the upper size limit for *Apatosaurus*. Linear measurements of the Oklahoma *Apatosaurus* imply a body mass roughly twice that of CM 3018. The latter specimen has been estimated to mass 18-40 tons. The Oklahoma giant may have massed 36-80 tons, potentially exceeding *Supersaurus* and *Brachiosaurus* and rivalling the largest titanosaurs.